



Introduction

Introduction to Thoracolumbar Spine Fractures: WFNS Spine Committee Recommendations




Salman Sharif



Corresponding Author

Mehmet Zileli

 <https://orcid.org/0000-0002-0448-3121>

Department of Neurosurgery, Ege
University Faculty of Medicine, Bornova
35100, Izmir, Turkey
Email: zilelim@gmail.com

Salman Sharif¹, Mehmet Zileli²

¹Department of Neurosurgery, Liaquat National Hospital & Medical College, Karachi, Pakistan

²Department of Neurosurgery, Ege University Faculty of Medicine, Izmir, Turkey

World Federation of Neurosurgical Societies (WFNS) Spine Committee is focused on giving a new horizon in light of research and available recent past data. With the increasing advances and day to day variations in surgical approaches, it has become extremely important to develop new guidelines and recommendations. After developing and publishing guidelines about cervical trauma,¹ spinal cord injury,² lumbar spinal stenosis,³ and cervical spondylotic myelopathy,⁴ the WFNS Spine Committee has developed recommendations regarding thoracolumbar (TL) spine trauma. This was achieved after a gross literature search between 2010 and 2020 and then holding a consensus meeting. It is an honour for me to be part of this work done during the chairmanship of Prof Zileli, Prof Fornari, and myself.

Up-to-date information was reviewed to reach an agreement in the World Federation of Neurosurgical Societies (WFNS) Spine Committee meeting. The first meeting was conducted live in Peshawar in December 2019, and the second meeting was a virtual meeting on June 12, 2020.

Both meetings aimed to analyze a preformulated questionnaire through preliminary literature review statements based on the current evidence levels to generate recommendations through a comprehensive voting session. Delphi method was utilized to administer the questionnaire to preserve a high degree of validity. The consensus was achieved when the sum for disagreement or agreement was $\geq 66\%$. Each consensus point was clearly defined, with evidence strength, recommendation grade, and consensus level provided.

The 6 papers you will find in the following pages are guidelines for almost all aspects of the TL fracture. The annual incidence of TL fractures is about 30/100,000 inhabitants, including osteoporotic fractures. There is a trend towards increasing fractures in developed countries, especially due to low velocity falls in the elderly population. The mortality rate after the spinal injury decreases in developed countries due to improvements in motor vehicle safety and traffic regulations.⁵

The TL spine is the most frequently injured spinal region in blunt trauma. The potential risk of concomitant injury to the spinal cord, chronic pain, and life-long disability presents a significant burden on patients and the health service. Due to the range of injury classification systems and varied treatment efficacy, literature on the indications for nonoperative treatment of TL fractures is conflicting.

The WFNS Spine Committee was able to formulate numerous key recommendations to guide clinical practice. Although compression-type fractures and stable burst fractures can



This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Copyright © 2021 by the Korean Spinal Neurosurgery Society

be managed conservatively, if there is significant vertebral body damage, kyphotic angulation, neurological deficit, spinal canal compromise, surgical treatment may be indicated. AO type B, C fractures are preferably treated surgically. Both new AO and Thoracolumbar Injury Classification and Severity Scale are reliable classifications of traumatic TL fractures and are widely used. Recent literature has shown that modified AO classification, despite being more complex, can be helpful in the management of TL fractures.⁶

Regarding the radiographic evaluation of TL fracture, the committee recommends that anteroposterior/lateral standard radiographs may be obtained if a computed tomography (CT) scan/magnetic resonance imaging (MRI) scan is not available. CT retains an important role in assessing trauma but cannot reliably demonstrate the disco-ligamentous complex. Hence MRI may be considered. MRI is the most commonly used advanced imaging method and is the method of choice in disco-ligamentous and spinal cord abnormalities and other pathologies associated with spinal trauma.⁷

Surgical treatment of TL fractures can be a better option over the nonoperative approach, especially for those who cannot tolerate months in an orthosis or cast, such as those with multiple extremity injuries, skin lesions, obesity, and so forth. AO type B and C fractures preferably should not be treated conservatively.⁸ AO type A2, A3, and A4 can be treated conservatively if there is no significant vertebral body collapse, significant kyphotic angulation or canal compromise with neurological impairment. There is no clinical evidence that Bracing for conservative treatment of TL fractures will improve the outcome.⁹

Moreover, fracture-dislocations and cases with significant instability (score ≥ 5 of Thoracolumbar Injury Classification and Severity Score classification) preferably should be operated. Surgical decompression and stabilization may be considered for burst fractures with neurological deficits, although there is not enough scientific evidence to support that. Burst fractures without neurological deficits can be treated either with conservative or surgical techniques.

In most cases, short segment posterolateral pedicle screw fixation is sufficient for burst fractures. Incorporating the fracture level screw is preferable for burst fractures of TL junction.

Long-segment fixation is a better option at TL junction burst fracture if fracture level screw cannot be incorporated.¹⁰

Long-segment screws are sufficient, and fusion is not needed. There is no difference between the anterior and posterior approaches regarding the clinical outcome in TL burst fractures. Minimally invasive techniques may be considered in the treat-

ment of TL burst fractures as the evidence suggests equivalent clinical outcomes. Compared to fusion surgery, nonfusion surgery for TL burst fractures has advantages of reduced bleeding, surgical time and donor site complications.¹¹

There is no statistical data suggesting the progression of regional kyphosis after nonfusion surgery.

Anterior vertebral body height loss of more than 50% may lead to progression of the kyphotic deformity. Detection of injury of the posterior longitudinal ligament complex is important as it significantly influence the outcome. Burst fractures with sagittal-transverse canal diameter ratio < 0.40 are highly associated with neurological injury and outcome.¹² The most common reason for posttraumatic kyphosis is untreated, unstable burst fractures. For treatment of posttraumatic kyphosis, the global sagittal balance has to be taken into consideration, and there is no proven definite kyphosis angle for indication of surgery. Posterior surgery can achieve satisfactory kyphosis correction with less blood loss and complications.

Future research is necessary to tackle the relative scarcity of evidence pertaining to patients with TL fractures. WFNS Spine Committee will continue to endeavour to teach, train, guide and inspire spine surgeons worldwide.

ACKNOWLEDGEMENTS

We want to thank all WFNS Spine Committee members for their outstanding contributions to the consensus meetings and unparalleled devotion to publish these guidelines.

REFERENCES

1. Zileli M, Konovalov N, Sharif S. Cervical spine trauma and spinal cord injury recommendations of WFNS Spine Committee. *Neurospine* 2020;17:704-7.
2. Sánchez JAS, Sharif S, Costa F, et al. Early management of spinal cord injury: WFNS Spine Committee Recommendations. *Neurospine* 2020;17:759-84.
3. Sharif S, Shaikh Y, Bajamal AH, et al. Fusion surgery for lumbar spinal stenosis: WFNS Spine Committee Recommendations. *World Neurosurg* X 2020;7:100077.
4. Zileli M. Recommendations of WFNS Spine Committee. *Neurospine* 2019;16:383-5.
5. Jansson KÅ, Blomqvist P, Svedmark P, et al. Thoracolumbar vertebral fractures in Sweden: an analysis of 13,496 patients admitted to hospital. *Eur J Epidemiol* 2010;25:431-7.
6. Verheyden AP, Spiegl UJ, Ekkerlein H, et al. Treatment of

- fractures of the thoracolumbar spine: Recommendations of the Spine Section of the German Society for Orthopaedics and Trauma (DGOU). *Global Spine J* 2018 Sep;8(2 Suppl): 34S-45S.
7. Rajasekaran S, Kanna RM, Shetty AP. Management of thoracolumbar spine trauma: an overview. *Indian J Orthop* 2015; 49:72-82.
 8. Vaccaro AR, Oner C, Kepler CK, et al. AOSpine thoracolumbar spine injury classification system: fracture description, neurological status, and key modifiers. *Spine* 2013;38: 2028-37.
 9. Bailey CS, Urquhart JC, Dvorak MF, et al. Orthosis versus no orthosis for the treatment of thoracolumbar burst fractures without neurologic injury: a multicenter prospective randomized equivalence trial. *Spine J* 2014;14:2557-64.
 10. Park SR, Na HY, Kim JM, et al. More than 5-year follow-up results of two-level and three-level posterior fixations of thoracolumbar burst fractures with load-sharing scores of seven and eight points. *Clin Orthop Surg* 2016;8:71-7.
 11. Lan T, Chen Y, Hu SY, et al. Is fusion superior to non-fusion for the treatment of thoracolumbar burst fracture? A systematic review and meta-analysis. *J Orthop Sci* 2017;22:828-33.
 12. Li S, Li Z, Hua W, et al. Clinical outcome and surgical strategies for late post-traumatic kyphosis after failed thoracolumbar fracture operation: Case report and literature review. *Medicine (Baltimore)* 2017;96:e8770.